Claims:

1. A method of selecting a relative orientation of an orthodontic appliance and a tooth comprising:

providing a first relative orientation of the appliance and the tooth;

defining a first set of rays extending between a base of the appliance and the tooth when the appliance and the tooth are in the first relative orientation;

determining the distance along each ray between the base and the tooth when the appliance and the tooth are in the first relative orientation;

relatively moving the appliance and the tooth in an arc about a reference axis to a second relative orientation;

defining a second set of rays extending between the base and the tooth when the appliance and the tooth are in the second relative orientation;

determining the distance along each ray between the base and the tooth when the appliance and the tooth are in the second relative orientation;

quantifying the difference between the distances determined when the appliance and the tooth are in the first relative orientation and the distances determined when the appliance and the tooth are in the second relative orientation; and

relatively moving the appliance and the tooth in an arc about the reference axis in a direction such that the quantified difference is reduced.

2. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 1 wherein the act of quantifying the difference between the distances determined when the appliance and tooth are in the first relative orientation to the distances when the appliance and tooth are in the second relative orientation includes the act of calculating a mean distance between the appliance and the tooth on at least one side of the reference axis when the appliance and tooth are in the first relative orientation and a mean distance between the appliance and the tooth on at least one side of the reference axis when the appliance and the tooth are in the second relative orientation.

3. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 1 wherein the act of quantifying the difference between the distances determined when the appliance and tooth are in the first relative orientation to the distances determined when the appliance and tooth are in the second relative orientation includes the act of calculating a root mean square distance between the appliance and the tooth on at least one side of the reference axis when the appliance and tooth are in the first relative orientation and a root mean square distance between the appliance and the tooth on at least one side of the reference axis when the appliance and the tooth are in the second relative orientation.

4. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 1 wherein the act of quantifying the difference between the distances determined when the appliance and tooth are in the first relative orientation to the distances determined when the appliance and tooth are in the second relative orientation includes the act of calculating a sum of the distances between the appliance and the tooth on at least one side of the reference axis when the appliance and tooth are in the first relative orientation and a sum of the distances between the appliance and the tooth on at least one side of the reference axis when the appliance and the tooth are in the second relative orientation.

5. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 1 and wherein the reference axis is generally perpendicular to the rays.

6. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 5 wherein the base has a center, and wherein the axis extends from the center.

7. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 6 wherein the axis extends in a generally mesial-distal direction.

8. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 6 wherein the axis extends in a generally occlusal-gingival direction.

9. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 1 wherein the reference axis is a first axis, and including the act of relatively moving the appliance and the tooth about a second axis, wherein the first axis and the second axis are both generally perpendicular to the rays, and wherein the first axis is generally perpendicular to the second axis.

10. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 9 wherein the first axis is a mesial-distal reference axis, and wherein the second axis is an occlusal-gingival reference axis.

11. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 1 and including the act of aligning the center of the base of the appliance with a mid-sagittal reference plane extending through the tooth.

12. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 1 and including the act of aligning the center of the base of the appliance with a mid-lateral reference plane extending through the tooth.

13. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 1 and including the act of aligning the appliance by use of a pair of intersecting crosshairs.

14. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 13 wherein the crosshairs intersect at an angle other than 90 degrees.

15. A method of selecting a relative orientation of an orthodontic appliance and a tooth comprising:

providing a first relative orientation of the appliance and the tooth;

defining a first set of rays extending between a base of the appliance and the tooth when the appliance and the tooth are in the first relative orientation;

determining the distance along each ray between the base and the tooth when the appliance and the tooth are in the first relative orientation;

providing a second relative orientation of the appliance and the tooth;

defining a second set of rays extending between the base and the tooth when the appliance and the tooth are in the second relative orientation;

determining the distance along each ray between the base and the tooth when the appliance and the tooth are in the second relative orientation; and

comparing the distances when the appliance and the tooth are in the first relative orientation to the distances when the appliance and the tooth are in the second relative orientation in order to select the orientation that corresponds to a closer fit between the base of the appliance and the tooth.

16. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 15 wherein the act of comparing the distances when the appliance and tooth are in the first relative orientation to the distances when the appliance and tooth are in the second relative orientation includes the act of calculating a mean distance between at least a portion of the base of the appliance and the tooth when the appliance and tooth are in the first relative orientation and a mean distance between at least a portion of the base of the appliance and the tooth when the appliance and the tooth are in the second relative orientation.

17. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 15 wherein the act of comparing the distances when the appliance and tooth are in the first relative orientation to the distances when the appliance and tooth are in the second relative orientation includes the act of calculating a root mean square distance between at least a portion of the base of the appliance and the tooth when the appliance and tooth are in the first relative orientation and a root mean square distance between at least a

portion of the base of the appliance and the tooth when the appliance and the tooth are in the second relative orientation.

18. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 15 wherein the act of comparing the distances when the appliance and tooth are in the first relative orientation to the distances when the appliance and tooth are in the second relative orientation includes the act of calculating a sum of the distances between at least a portion of the base of the appliance and the tooth when the appliance and tooth are in the first relative orientation and a sum of the distances between at least a portion of the base of the appliance and the tooth when the appliance and the tooth are in the second relative orientation.

19. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 15 and including the act of relatively moving the appliance and the tooth about an axis generally perpendicular to the rays in order to move the appliance in the first orientation to the second orientation.

20. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 19 wherein the base has a center, and wherein the axis extends from the center.

21. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 20 wherein the axis extends in a generally mesial-distal direction.

22. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 20 wherein the axis extends in a generally occlusal-gingival direction.

23. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 15 and including the act of relatively moving the appliance and the tooth about a first axis and subsequently relatively moving the appliance and the tooth about a

second axis, wherein the first axis and the second axis are both generally perpendicular to the rays, and wherein the first axis is generally perpendicular to the second axis.

24. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 23 wherein the first axis is a mesial-distal reference axis, and wherein the second axis is an occlusal-gingival reference axis.

25. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 15 and including the act of aligning the center of the base of the appliance with a mid-sagittal reference plane extending through the tooth.

26. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 15 and including the act of aligning the center of the base of the appliance with a mid-lateral reference plane extending through the tooth.

27. A method of selecting a relative orientation of an orthodontic appliance and a tooth comprising:

defining a set of rays extending between the appliance and a tooth, wherein each ray extends from a point located on the base of the appliance and the point located on the tooth;

determining the distance along the rays between each point on the base and each corresponding point on the tooth; and

relatively moving the appliance and the tooth in an arc about a reference axis in a direction such that the sum of the differences between each distance and the mean of the distances is reduced.

28. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 27 wherein the method includes the act of calculating a mean distance of at least some of the distances determined when the appliance and tooth are in the first relative orientation and a mean distance of at least some of the distances determined when the appliance and the tooth are in the second relative orientation, and wherein the act of relatively

moving the appliance and the tooth is carried out by relatively moving the appliance and the tooth in a direction that reduces the sum of the mean distances.

29. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 27 wherein the method includes the act of calculating a root mean square distance of at least some of the distances determined when the appliance and tooth are in the first relative orientation and a root mean square distance of at least some of the distances determined when the appliance and the tooth are in the second relative orientation, and wherein the act of relatively moving the appliance and the tooth is carried out by relatively moving the appliance and the tooth in a direction that reduces the sum of the root mean square distances.

30. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 27 wherein the method includes the act of calculating a first sum of at least some of the distances when the appliance and tooth are in the first relative orientation and a second sum of at least some of the distances when the appliance and the tooth are in the second relative orientation, and wherein the act of relatively moving the appliance and the tooth is carried out by relatively moving the appliance and the tooth in a direction that reduces the difference between the first and second sums.

31. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 27 and including the act of relatively moving the appliance and the tooth about an axis generally perpendicular to the rays in order to move the appliance in the first relative orientation to the second relative orientation.

32. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 31 wherein the base has a center, and wherein the axis extends from the center.

33. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 31 wherein the axis extends in a generally mesial-distal direction.

34. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 32 wherein the axis extends in a generally occlusal-gingival direction.

35. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 27and including the act of relatively moving the appliance and the tooth in an arc about a second reference axis, and further including the act of determining the distances along the rays between each point on the base and each corresponding point on the tooth when the appliance and the tooth are in a first and second relative orientation with respect to the second reference axis.

36. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 27 wherein the rays extend in generally parallel directions.

37. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 27 and including the act of aligning the center of the base of the appliance with a mid-sagittal reference plane extending through the tooth.

38. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim27 and including the act of aligning the center of the base of the appliance with a mid-lateral reference plane extending through the tooth.

39. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 27 and including the act of relatively moving the appliance and the tooth in an arc about a second reference axis in a direction such that the sum of the differences between each distance and the mean of the distances is reduced.

40. A method of selecting a relative orientation of an orthodontic appliance and a tooth according to claim 27 wherein the appliance is also moved along the surface of the tooth and/or moved in a rotative direction about its labio-lingual axis to a user-specified orientation.

41. A computer readable storage medium having program code stored thereon that, when executed by a computer, performs any of the methods of Claims 1-40.